

COMPUTER AIDED DRAFTING I

COURSE DESCRIPTION

Computer Aided Drafting I is a course in which students learn the basic concepts of scale drawings and orthographic projections by making simple two- and three-dimensional drawings using manual drafting tools and computer-aided drafting (CAD). Course content will enable students to make the transition into the use of CAD software by having them make increasingly sophisticated drawings. Student work in teams will culminate in a class project to create a complete set of construction and assembly drawings for a mechanical product..

It is strongly recommended that administration and guidance follow the scope and sequence and course recommendations as listed.

Recommended: Math and science requirements should be obtained according to graduation requirements during and prior to the conclusion of the credits. Concurrency is acceptable.

Recommended Credits: 1

Recommended Grade Level(s): 9th

Number of Competencies in Course: 30

Note: Course will include 9 to 18 weeks of pencil drawings prior to beginning work on computer aided drawing projects.

*This course may be offered as a part of the Construction or the Manufacturing Sub-Cluster, depending upon the student's career focus.

COMPUTER AIDED DRAFTING I

STANDARDS

- 1.0** Students will take personal responsibility for the safety of themselves, their coworkers, and bystanders and perform safety examinations and maintain safety records.
- 2.0** Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community, and workplace.
- 3.0** Students will integrate reading, writing, math, and science skills and understand the impact of academic achievement in the work place.
- 4.0** Students will demonstrate proficiency in basic drafting techniques and creating two-dimensional scale drawings.
- 5.0** Students will demonstrate proficiency in creating manual three-dimensional scale drawings.
- 6.0** Students will use the basic functions of a CAD software program to draw two-dimensional objects.

COMPUTER AIDED DRAFTING I

STANDARD 1.0

Students will take personal responsibility for the safety of themselves, their coworkers, and bystanders and perform safety examinations and maintain safety records.

LEARNING EXPECTATIONS

The student will:

- 1.1** Pass with 100% accuracy a written examination safety issues specific to this course of study.
- 1.2** Pass with 100% accuracy a performance examination on tools and equipment specific to this course of study.
- 1.3** Maintain a portfolio with a copy of written safety examinations and equipment examinations for which the student has passed an operational checkout by the instructor.
- 1.4** Follow rules and regulations to comply with personal and lab safety standards, including general, fire, and electrical standards.
- 1.5** Practice and apply health and safety OSHA standards as they pertain to the course.
- 1.6** Select tools, technology, machinery, equipment, and materials appropriate for the given assignment.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

- 1.1** Passes with 100% accuracy a written examination on safety issues specific to this course of study.
- 1.2** Passes with 100% accuracy a performance examination on tools and equipment specific to this course of study.
- 1.3** Maintains a portfolio record with a copy of written safety examinations and equipment examinations for which the student has passed an operational checkout by the instructor.
- 1.4** Demonstrates and follows procedures for classroom and lab safety, fire safety, and electrical safety.
- 1.5** Assesses and applies health and safety OSHA standards as they pertain to the course.
- 1.6A** Demonstrates appropriate use of tools to complete assignments.
- 1.6B** Identifies sources of information concerning state-of-the-art tools, equipment, materials, and technologies.
- 1.6C** Identifies potential hazards related to use of tools and equipment.

SAMPLE PERFORMANCE TASKS

- Assess the work area for safety hazards.
- Design a corrections program for identified hazards.
- Model the appropriate protective equipment for an assigned task.
- Read manufacturer specifications to determine safe practices while working on various electrical and electronic systems.
- Demonstrate personal safety (e.g., dress, eye and hearing devices, and jewelry).

- Demonstrate the handling and disposing of chemicals.
- Complete a safety inspection evaluating possible fire and water hazards.
- Develop a presentation on right to know laws and any other laws required for safety.
- Practice safe disposal procedures for chemicals used in related processes.
- Practice ergonomic processes when using computers and equipment.
- Prepare an Occupational Safety and Health notebook for the Tennessee SkillsUSA Championships.

INTEGRATION LINKAGES

Science, Computer Skills, Research and Writing Skills, Language Arts, Communication Skills, Leadership Skills, Teamwork Skills, Algebra, Geometry, Secretary's Commission on Achieving Necessary Skills (SCANS), SkillsUSA, Skills USA *Professional Development Program* (PDP), SkillsUSA *Total Quality Program* (TQP)

COMPUTER AIDED DRAFTING I

STANDARD 2.0

Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community, and workplace.

LEARNING EXPECTATIONS

The student will:

- 2.1** Cultivate positive leadership skills and work ethics.
- 2.2** Participate in the approved student organization and other industry organizations directly related to their program of study as an integral part of classroom instruction.
- 2.3** Assess situations, apply problem-solving techniques and decision-making skills within the school, community, and workplace.
- 2.4** Participate as a team member in a technical learning environment.
- 2.5** Be aware and adaptive to individual differences, customs, and culture of others.
- 2.6** Develop a personal career plan identifying career organizations, interests, strengths and opportunities.
- 2.7** Respect the opinions, direction, and constructive criticisms of career professionals and leaders.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

- 2.1A** Demonstrates character and leadership using creative-and critical-thinking skills.
- 2.1B** Uses creative thought process by “thinking outside the box.”
- 2.2A** Relates the creed, purposes, motto, and emblem of their student organization, directly related to personal and professional development.
- 2.2B** Plans and conducts meetings and other business according to accepted rules of parliamentary procedure.
- 2.3A** Makes decisions and assumes responsibilities.
- 2.3B** Analyzes a situation and uses a professional development program or career technical student organization materials directly related to the student’s program of study to resolve it.
- 2.3C** Understands the importance of learning new information for both current and future problem solving and decision making.
- 2.4A** Organizes committees and participates in functions.
- 2.4B** Cooperates with peers to select and organize a community service project.
- 2.5A** Researches different customs and individual differences of others.
- 2.5B** Interacts respectfully with individuals of different cultures, gender, and backgrounds.
- 2.6A** Creates personal career development by identifying career interests, strengths, and opportunities.
- 2.6B** Identifies opportunities for career development and certification requirements.
- 2.6C** Plans personal educational paths based on available courses and current career goals.
- 2.6D** Creates a resume that reflects student’s skills, abilities, and interests.
- 2.6E** Demonstrates professional industry organization relationships to support career paths upon program completion.
- 2.7** Resolves conflicts and differences to maintain a smooth workflow and classroom environment.

SAMPLE PERFORMANCE TASKS

- Create a leadership inventory and use it to conduct a personal assessment.
- Participate in various career and technical student organization programs and/or competitive events.
- Implement an annual program of work.
- Prepare a meeting agenda for a specific career and technical student organization monthly meeting.
- Attend a professional organization meeting.
- Develop a program of study within their career opportunities.
- Participate in the American Spirit Award competition with SkillsUSA.
- Complete *Professional Development Program Level I and Level II*, SkillsUSA.
- Participate in National Design Drafting Week, Annual Drafting Contest, Annual Poster Contest

INTEGRATION LINKAGES

SkillsUSA, *Professional Development Program*; SkillsUSA; Communications and Writing Skills; Teambuilding Skills; Research; Language Arts; Sociology; Psychology; Math; English IV; Social Studies; Problem Solving; Interpersonal Skills; Employability Skills; Critical-Thinking Skills; Secretary's Commission on Achieving Necessary Skills (SCANS); Chamber of Commerce; Colleges; Universities; Technology Centers; Secretary's Commission on Achieving Necessary Skills (SCANS)

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STANDARD 3.0

Students will integrate reading, writing, math, and science skills and understand the impact of academic achievement in the work place.

LEARNING EXPECTATIONS

The student will:

- 3.1** Be responsible for accomplishing classroom assignments and workplace goals within accepted time frames.
- 3.2** Develop advanced study skills.
- 3.3** Demonstrate and use written and verbal communication skills.
- 3.4** Read and understand technical documents, such as regulations, manuals, reports, forms, graphs, charts, and tables.
- 3.5** Apply the foundations of mathematical principles such as algebra, geometry, and advanced math to solve problems.
- 3.6** Apply basic scientific principles and methods to solve problems and complete tasks.
- 3.7** Demonstrate an understanding of computer operations and related applications to input, store, retrieve, and output information as it relates to the course.
- 3.8** Research, recognize, and understand the interactions of the environment and green issues as they relate to the course work and to a global economy.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

- 3.1A** Uses appropriate time management to achieve goals.
- 3.1B** Arrives at class at an acceptable time each day.
- 3.1C** Completes assignments and meets deadlines.
- 3.1D** Arrives properly dressed and prepared.
- 3.2A** Assesses current personal study skills.
- 3.2B** Demonstrates advanced note-taking ability.
- 3.2C** Formulates appropriate study strategies for given tasks.
- 3.3A** Communicates ideas, information, and messages in a logical manner.
- 3.3B** Fills out forms, reports, logs, and documents to comply with class and project requirements.
- 3.4A** Reads and understands technical documents and uses industry jargon, acronyms, and terminology appropriately.
- 3.4B** Recognizes the meaning of specialized words or phrases unique to the career and industry.
- 3.5A** Utilizes computation, both manually and electronically, in adding, subtracting, multiplying, and dividing of whole numbers, fractions, decimals, and percents.
- 3.5B** Chooses the right mathematical method or formula to solve a problem.
- 3.5C** Performs math operations accurately to complete classroom and lab tasks.
- 3.6A** Demonstrates an understanding of scientific principles critical to the course.
- 3.6B** Applies scientific principles and technology to solve problems and complete tasks.
- 3.6C** Has knowledge of the scientific method (e.g., identifies the problem, collects information, forms opinions, and draws conclusions).
- 3.7A** Uses basic computer hardware (e.g., PC's, printers) and software to perform tasks as required for the course work.

- 3.7B** Demonstrates an understanding of capabilities of computers and common computer terminology (e.g., program, operating system).
- 3.7C** Applies the appropriate technical solution to complete tasks.
- 3.7D** Inputs data and information accurately for the course requirements.
- 3.8A** Researches and recognizes green trends in career area and industry.
- 3.8B** Examines current environmentally friendly trends.
- 3.8C** Applies sustainability practices by understanding processes that are non-polluting, conserving of energy and natural resources, and economically efficient.

SAMPLE PERFORMANCE TASKS

- Examine and compile different learning styles for portfolios.
- Create calendars containing all activities and obligations for one month. Discuss how to handle conflicting or competing obligations then complete daily and weekly plans showing tasks, priorities, and scheduling.
- Complete self-assessments of study habits.
- Compute precise and exact measurements.
- Explore study strategies for different subjects and tasks, then, analyze two homework assignments and select the best strategies for completing them.
- Create “life maps” showing necessary steps or “landmarks” along the path to personal, financial, educational, and career goals.
- Take notes during counselor classroom visits and work in small groups to create flow charts of the path options.
- List ethics that lead to success then rate individually in these areas. Work together to suggest strategies for overcoming the weaknesses identified (own and partners’ self-assessments), then, share with the class the strategies developed.
- Research the Internet and other resources to collect and analyze data concerning climate change.
- Keep a data file of alternative energy sources and the sources’ impact on the environment.
- Develop a recycling project at home or for the school environment.

INTEGRATION LINKAGES

SkillsUSA, Professional Development Program; SkillsUSA; Communications and Writing Skills; Teambuilding Skills; Research; Language Arts; Sociology; Psychology; Math; English; Social Studies; Problem Solving; Interpersonal Skills; Employability Skills; Critical-Thinking Skills; Secretary’s Commission on Achieving Necessary Skills (SCANS); Chamber of Commerce; Colleges; Universities; Technology Centers; Secretary’s Commission on Achieving Necessary Skills (SCANS)

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STANDARD 4.0

Students will demonstrate proficiency in basic drafting techniques and creating two-dimensional scale drawings.

LEARNING EXPECTATIONS

The student will:

- 4.1** Demonstrate proficiency in line techniques, lettering forms, sketching techniques, and geometric constructions.
- 4.2** Create accurate and complete scale drawings of two-dimensional objects and two-dimensional plans.
- 4.3** Apply drawing dimensioning rules using basic measurement systems.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

- 4.1A** Demonstrates understanding of the alphabet of lines by creating drawings using proper line weights and types.
- 4.1B** Annotates drawings with labels and dimensions using basic manual lettering styles and techniques.
- 4.1C** Develops two-dimensional drawings by using proper sketching techniques.
- 4.1D** Develops two-dimensional drawings by using proper geometric construction techniques.
- 4.2A** Makes scale drawings of given two-dimensional objects by means of orthographic projections, auxiliaries, and sections, including floor plans and equipment.
- 4.2B** Creates and completes title blocks on drawings.
- 4.3A** Applies dimensioning rules, such as avoiding redundancy and dimensioning to hidden lines, dual dimensions, and properly indicated tolerances.
- 4.3B** Uses basic measurement skills and systems, including fractions, decimals, English, and metric.

SAMPLE PERFORMANCE TASKS

- Complete a scale drawing of a mechanical object or device.
- Complete a scale drawing of the floor plan of your house.
- Complete a scale drawing of a parking lot and surrounding area.
- Complete a scale drawing of fire escape routes for each floor of school building.

INTEGRATION/LINKAGES

Foundation for Industrial Modernization (FIM). *What Manufacturing Workers Need to Know and Be Able to Do: National Voluntary Skill Standards for Advanced High Performance Manufacturing*. Washington, DC: National Coalition for Advanced Manufacturing, 1995. Foundation for Industrial Modernization (FIM). *National Occupational Skill Standards for Computer Aided Drafting and Design (CADD)*. Washington, DC: FIM, 1995. International Technology Education Association. *Standards for Technological Literacy: Content for the Study of Technology*. International Technology Education Association. Reston, VA, 2000. Manufacturing Skill Standards Council. *A Blueprint for Workforce*

Excellence (draft skill standards for manufacturing.) Manufacturing Skill Standards Council, 2001.
Mathematics concepts and skills.

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STANDARD 5.0

Students will demonstrate proficiency in creating manual three-dimensional scale drawings.

LEARNING EXPECTATIONS

The student will:

- 5.1** Create complete orthographic projections of simple three-dimensional objects.
- 5.2** Create complete orthographic projections of complex three-dimensional objects.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

- 5.1** Makes orthographic pencil drawings of simple three-dimensional objects, including appropriate dimensioning and auxiliary and sectional views.
- 5.2A** Uses hidden lines to show internal or hidden features of simple three-dimensional objects.
- 5.2B** Makes orthographic pencil drawings of complex three-dimensional objects, including appropriate dimensioning and auxiliary and sectional views.
- 5.2C** Uses hidden lines to show internal or hidden features of complex three-dimensional objects.

SAMPLE PERFORMANCE TASKS

- Complete a drawing of custom-shaped metal/wooden blocks.
- Complete a scale drawing of the exterior details of a computer monitor.
- Complete a drawing of the teacher's desk.

INTEGRATION/LINKAGES

Foundation for Industrial Modernization (FIM). *What Manufacturing Workers Need to Know and Be Able to Do: National Voluntary Skill Standards for Advanced High Performance Manufacturing*. Washington, DC: National Coalition for Advanced Manufacturing, 1995. Foundation for Industrial Modernization (FIM). *National Occupational Skill Standards for Computer Aided Drafting and Design (CADD)*. Washington, DC: FIM, 1995. International Technology Education Association. *Standards for Technological Literacy: Content for the Study of Technology*. International Technology Education Association. Reston, VA, 2000. Manufacturing Skill Standards Council. *A Blueprint for Workforce Excellence (draft skill standards for manufacturing.)* Manufacturing Skill Standards Council, 2001. Mathematics concepts and skills.

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STANDARD 6.0

Students will use the basic functions of a CAD software program to draw two-dimensional objects.

LEARNING EXPECTATIONS

The student will:

- 6.1** Use basic software operations.
- 6.2** Use standard software templates and create new software templates for.
- 6.3** Use a software program to draw and dimension simple two-dimensional objects.
- 6.4** Use a software program to draw and dimension orthographic projections of three-dimensional objects.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

- 6.1** Performs software operations, including creating, saving, opening, filing, plotting/printing, drawing files.
- 6.2A** Makes drawings using existing software templates.
- 6.2B** Creates and uses new custom software templates.
- 6.3A** Makes scale drawings of simple two-dimensional objects using a software program.
- 6.3B** Annotates, dimensions, and titles scale drawings of two-dimensional objects using a software program.
- 6.4A** Makes an orthographic projection to scale of three-dimensional objects using a software program.
- 6.4B** Annotates, dimensions, and titles scale drawings of three-dimensional objects using a software program.

SAMPLE PERFORMANCE TASKS

- Create a scale drawing of a floor plan of the school auditorium using a software program.
- Use a software template to produce simple drawing of uniform characteristics by all class members.
- Create templates for small detail objects (e.g., watch) and large scale drawing (e.g., city map).
- Create an orthographic projection of a calculator using a software program.

INTEGRATION/LINKAGES

Foundation for Industrial Modernization (FIM). *National Occupational Skill Standards for Computer Aided Drafting and Design (CADD)*. Washington, DC: FIM, 1995. International Technology Education Association. *Standards for Technological Literacy: Content for the Study of Technology*. International Technology Education Association. Reston, VA, 2000. Manufacturing Skill Standards Council. Mathematics concepts and skills. Computer Science concepts and skills.